XX.—*Descriptions and Figures of Deep-Sea Sponges and their Spicules, from the Atlantic Ocean, dredged up on board H.M.S. 'Porcupine,' chiefly in* 1869 (*concluded*). By H. J. Carter, F.R.S. &c.

[Plates XII.–XVI.]

In July 1871 Prof. (now Sir) C. Wyville Thomson asked me if I would undertake to describe the sponges dredged up on board H.M.S. 'Porcupine' in 1869, to which I consented, when I had finished arranging the collections of sponges in the British Museum about which I was then engaged. In June 1872 Prof. Thomson sent me 108 jars containing these sponges in spirit, besides some small boxes containing dried specimens. Most of the former had labels on them; but the latter were without any. Prof. Thomson was then busily engaged in preparing for the expedition of H.M.S. 'Challenger;' and all that he had time to state was that the jars were labelled in accordance with the numbers of the stations and depths on the Charts which accompanied the "Preliminary Report of the Scientific Expedition of the Deep Sea in H.M.S. 'Porcupine' during the summer of 1869" (Proceed. Royal Soc. no. 121), and that I might use them as I liked for the purpose mentioned, only leaving them in "some kind of order" when their descriptions had been completed.

On their arrival, I first numbered all the jars and dried specimens with a running number of my own, which they still bear. Then every specimen, both fragmentary and entire, was sketched and examined microscopically, and the sketch and microscopic detail placed under these numbers respectively. After this, whatever figures the labels on the jars bore were added to their respective numbers. Thus, having secured a memorandum of all that I possessed in this way in case of accident, the whole was laid aside for deliberate examination when the opportunity offered—that is, when I had finished my examination and arrangement of the collections of sponges in the British Museum.

Soon it became evident to me from the latter that I must make a "classification" for myself; for nothing that had been produced would suffice for this purpose; and hence I was obliged to postpone describing the greater part of the sponges dredged up on board H.M.S. 'Porcupine' until this was completed and printed ('Annals,' 1875, vol. xvi. p. 1 &c.).

Meanwhile, in 1873, I published a paper on two *Gummineæ*, one of which came from the 'Porcupine' ('Annals,' vol. xii. p. 17); then a paper on the Hexactinellidæ and Lithistidæ, in 1873, wherein the specimens of *Aphrocallistes Bocagei*,

Farrea occa, &c., from the same source, were described (*op. cit.* vol. xii. p. 445). After this several of these sponges were described and illustrated in 1874 (*op. cit.* vol. xiv. p. 207 &c.); and now I have to offer the remainder,—dredged up on board the 'Porcupine' in 1869 and 1870.

As regards the form and measurements of sponges, whether entire or fragmentary, and as regards that of their spicules, nothing can be more variable. They all grow from small to large, and all may *vary* more or less in every respect during the course of their development; so that what I have stated in this paper must be understood to be what the sponges dredged up on board the 'Porcupine' *only*, present.

Thus, then, as the spicules in particular grow from small to large, and are successively developed, they will be found to be of all sizes in the sponge to which they may belong. Hence their average largest size respectively has been taken for description, measurement, and illustration.

The measurements are all in parts of an inch; and for the convenience of the student they are given in accordance with the divisions of my micrometer eye-piece, viz. in 1800ths or 6000ths of an inch, under a magnifying-power approximately of 85 and 266 diameters; while for the detail other powers (of 120 and 375 approximately) have been employed.

As the numbers *alone* are given in the descriptions, they must be understood to refer to the *greatest diameters* of the *average largest* size of the spicule, without this being expressed. Thus the description of an acerate or linear form may have appended to it, "100-1800ths by 2-1800ths inch," which means 100-1800ths inch long and 2-1800ths inch broad in its *greatest diameters*. By this the student will at once be able to draw the spicule to any scale; or if he chooses to reduce the fractions to their ultimate value,—he would get in this instance 1-18th by 1-900th inch.

Again, a spicule may be attenuatingly or abruptly pointed—that is, drawn out gradually to a sharp point or abruptly terminating in one which, if altogether omitted, would give a round end. This is the meaning of these expressions.

Lastly, as regards colour. It should be remembered that all the specimens have come to me in spirit or dry respectively, and therefore that, as the colours of sponges are in some instances permanent and in others evanescent, I can only give that colour which these sponges *now* present to me. *Aplysina nævus* still retains its dark red-purple tint; but most of the rest present different shades of what may be termed "sponge-colour," viz. tawny, light yellow, grey, or whitish; at the same time, these are the colours which sponges usually have.

An "Addendum" will be appended, in which a list of *all* the sponges dredged up by the 'Porcupine' during her cruises in 1869 and 1870, with their respective localities generally, will be given; then a list of all the *dried* specimens without numbers which have been handed over to me; finally, a few "Memoranda" on some minute organisms which accompanied the sponges—to wit, *Polytrema*, *Xanthidium*, and Coccoliths, together with a note on the "black grains" often seen in great abundance in the Globigeriniferous sand.

Halisarca cruenta, n. sp.

General form film-like, spreading, with irregularly undulating margin. Colour madder-brown, crimson, becoming crimson-black on the surface when dry. Surface smooth, corresponding with the irregularities of the object on which it may be growing; consisting of a delicate sarco-fibrous layer. Pores and vents not recognized. Internal structure madder-pink, composed of areolar sarcode in which are imbedded the ampullaceous sacs and, when present, also ova, which are known by their spherical form and deeper colour; traversed by the branched excretory canal-system. Ampullaceous sacs about 10-6000ths inch in diameter; spongozoa about $\frac{3}{4}$-6000th, and ova about 4-6000ths inch in diameter. Size of specimens varying, under 2 inches in horizontal diameter.

Hab. Marine, on the surface of *Corallistes Bowerbankii*, Johnston; *Stelletta pachastrelloides*, n. sp., and *Pachastrella abyssi*, Sdt., extending into and tinging with its red colour for a certain distance the structure on which it may be growing.

Loc. Station 25=374 fathoms—that is (as the "station" and "depth" are inserted together on the "Chart"), a few miles north of Cape St. Vincent.

Obs. This sponge has very much the appearance of spots of venous blood, especially when dry; and the colour is deepest where the specimen is charged with ova, from the dark crimson colour of the latter. It looks very much like *Hildenbrandtia rubra* at first sight, on account of its thinness and dark blood-red colour; but the absence of the algal cell and the presence of ova distinguish it from the cellular structure charged with conceptacles bearing tetraspores and paraphyses in the latter. As the specimens are not favourable for description, the above observations must to a certain extent be taken provisionally. It is at all times difficult to make out the minute structure of *Halisarca*, which can only be most advantageously examined

while living, less so after having been placed in spirit and water *when living*, and least of all when allowed to dry or pass into dissolution, which it does almost immediately after death. My specimens, therefore, being for the most part dry, and the two in spirit broken down in structure, are, as just stated, not in a favourable state for description. Were a figure to be given of this sponge, it would be hardly more than a blot of red or crimson ink upon a piece of paper.

Corticium parasiticum, n. sp. (Pl. XVI. fig. 52.)

General form incrusting, minute, soft, fibreless. Colour grey. Surface even, pierced by the ends of the spicules of the species. Pores and vents not seen. Internal structure composed of areolar sarcode charged with small spicules. Spicules of one kind only, viz. pin-like, nearly straight, or more or less curved irregularly and suddenly, especially towards the large end; head smooth, globular, a little wider in diameter than the thickest part of the shaft; shaft conical, not fusiform, round, sharp-pointed, microspined throughout; 30–40- by $\frac{1}{2}$-6000ths inch, densely charging the sarcode confusedly—that is, apparently without definite arrangement.

Hab. Marine, incrusting dead stems of *Esperia cupressus* n. sp., var. *bihamatifera*.

Loc. Station 42 = 862 fathoms, "chops" of English Channel.

Obs. This species covers the stems of two specimens of the *Esperia* mentioned, dredged up very near the station from which *Corticium abyssi* was obtained ('Annals,' 1873, vol. xii. p. 18, pl. i. fig. 1 &c.). It appears to me to be the sponge which has given the characteristic surface-spicule to Schmidt's *Cometella gracilior*, whatever the original form of *Cometella* on which it grew might have been (Atlantisch. Spongienf. p. 49, Taf. iv. fig. 9). There is no doubt of its being a parasite here; for not only the stem, but a part of the pinnatifid branches of the *Esperia* are present under it, together with all their characteristic spicules. I have often seen a parasitic sponge charged with pin-like spicules, although not of the same form as that above mentioned; and it has also often struck me that the spiculous suborder of Carnosa, viz. Gumminida, may by-and-by be found to pass into the suborder Suberitida of my Holorhaphidota, where there appears to be no fibre and no definite arrangement of the spicules, with which the sarcode is densely charged.

Aplysina nævus, n. sp. (Pl. XII. figs. 2 & 1, *c*.)

General form spiniferous, flat, thin, spreading, sessile. Colour

madder-red. Surface rising into thorn-like processes, from each of which projects a single hair-like horny filament about $\frac{1}{8}$ inch in length, of a dark amber-colour, that often sends off a minor branch at its exit, and thus becomes bifurcated. Covered with an incrustation of minute foreign bodies, disposed in a reticulate form with depressed interstices. Foreign bodies consisting of a heterogeneous mixture of sand-grains, fragments of sponge-spicules, minute Foraminifera, and the like, which, on becoming dry, presents an opaque pinkish grey colour that conceals the dark red fleshy portion of the interior. Pores in the interstices of the incrustation (fig. 2, *b*). Vents not observed. Internal structure soft, fleshy, consisting of a thin layer of compact areolar sarcode traversed perpendicularly by thick, horny, hair-like filaments of a dark amber-colour (fig. 2, *a*), which, rising singly and separately from an expanded circular disk respectively on the basal layer of the sponge (fig. 2, *c*), that attaches the latter to the hard object on which it may be growing, pursue a perpendicular course towards the surface, where they respectively issue from the ends of the thorn-like processes, as before stated. Horny filament hollow, conical, ending in an attenuated form externally, where it is frequently bifurcated or divided into two portions of unequal length, as above mentioned. Sarcode charged with minute bodies (? spongozoa or pigment-cells) of a red colour, which thus give the characteristic colour to the sponge generally in the fresh or undried state. Size of specimens about $\frac{3}{4}$ inch in their longest horizontal diameter.

Hab. Marine, growing over hard objects.

Loc. Between the north of Scotland and the Faroe Islands, and a little north-west of the Shetlands, in 345 and 312 fathoms respectively.

Obs. For an account of the Aplysinida see 'Annals,' 1872, vol. x. p. 101. Specimens of this sponge exist in two jars numbered (Stations) 65 and 82 respectively, which give the localities and depths above mentioned. The former has spread itself over part of the upper valve of a Terebratule (fig. 1, *c*), and the latter round a fragment of a branch of stony coral (fig. 2). It has been designated "*nævus*" specifically, from the surface being like a raised red "mother's-mark," hairy and papillated; while the interior is characterized by single, separated horny filaments, which traverse the interior of the sponge perpendicularly, and do not give off any branches until arriving at their point of issue from the summits respectively of the thorn-like processes of the surface, when they frequently, but not always, become divided into two branches of unequal length. The reticulated appearance of the incrus-

tation, which is only observed in the dry specimens, indicates that, as usual, the accumulation of the foreign objects is confined to the lines of the subjacent, in this instance subcorneous, dermal reticulated structure.

On the 29th March last the Rev. A. M. Norman sent me another species of this genus, for which he proposes the specific name of "*incrustans*." It only differs from that above described in the papillæ of the surface not being so prominent and thorny, and in its structure being areolar and sandy *throughout* like that of *Dysidea fragilis*, and of a light yellow instead of a pink cream-colour when dry. *Loc.* "Shetland, 170 fathoms," on hard objects.

Spongia officinalis. (Pl. XII. fig. 1, *d*.)

General form unequally lobate, spreading, sessile. Colour light brown. Surface irregularly lobed and minutely divided into polygonal spaces by the dermal horny reticulation, which supports and thus shows itself through the transparent dermal sarcode, projecting from the latter at the knots or points of union of the lines respectively in attenuated, minute, horny filaments, which give the surface a hairy appearance. Pores in the interstices of the dermal reticulation. Vents large and irregular both in size and situation. Internally consisting of a densely reticulate, anastomosing, horny, transparent, tough, brownish fibre, which gives the brown colour to the sponge; supporting transparent areolar sarcode, which is traversed by the excretory canal-system, often running in a branched form for some distance just below the dermal sarcode before opening at the vents mentioned. Size 1¼ inch in its largest diameter.

Hab. Marine, on hard objects.

Loc. Same as that of *Aplysina nævus*, viz. station 65.

Obs. This, which is a genuine specimen, although small, of *Spongia officinalis*, is only found in the jar numbered 65, where it has partly overgrown the upper valve of the same Terebratule as that on which *Aplysina nævus* has spread itself (fig. 1, *d*), presenting between them a small portion of *Dysidea fragilis* (fig. 1, *e*).

While the Terebratule bears the three sponges just mentioned, it is itself fixed to a pebble (fig. 1, *a*) which bears in addition two small specimens of *Phakellia infundibuliformis*, Johnst. (fig. 1, *fff*), also the basal fragment of a cylindrical calcareous worm-tube over which *Latrunculia cratera*, Bocage, has grown (fig. 1, *gg*), and at the foot of this on the pebble a little patch of *Microciona longispiculum*, n. sp. (fig. 1, *h*); so that the pebble and the Terebratule together bear six species

of sponges. In the same jar also are specimens of *Dictyocylindrus abyssorum*, n. sp.; *Phakellia infundibuliformis*; *Halichondria Hyndmani*, Bk.; *Wyville-Thomsonia Wallichii*, Wright, = *Tisiphonia agariciformis*, Wy. T.; and *Pachastrella abyssi*, Sdt.

Hircinia (*Polytherses*, Duchas. de Fonb. et Mich.).

A small cubical fragment, about two inches in diameter, of coarse structure and brown colour, in which the sarcode has been entirely replaced by the alga *Spongiophaga communis*.

Loc. Station 25, in 374 fathoms, near Cape St. Vincent.

Spongelia pallescens, Sdt. (Adriat. Spongienf. p. 30, Taf. iii. fig. 8).

In jar 84, depth 155 fathoms, there is a finger-shaped fragment or lobe of this sponge about 2 inches long and $\frac{1}{2}$ inch in diameter, now of a light whitish grey colour. It appears to have been torn off from a larger specimen. The surface presents a uniformly reticulated structure, in which the knots consist of sharp monticular eminences, and the interstices are depressed as is usual in all the Psammonemata, with here and there a large circular vent. It is sandy throughout, but differs from the following (viz. *Dysidea fragilis*) in possessing a more definite form, which arises, perhaps, from the horny element being more developed, both around the sandy cores and as simple fibre throughout the structure generally. There is an arenaceous sponge in the British Museum of a greyish brown colour, massive and lobed, with large vents, which seems to be an intermediate species. It comes from Port Jackson in Australia; and the variety of spicules amongst its sand-grains is very remarkable, as indicating the number of different sponges that must be in that locality. Of course, the nature of the foreign contents depends entirely upon the kind of material at hand for the sponge to build with.

Dysidea fragilis, Johnst.

Small amorphous fragments of this sponge were dredged up at stations 65 and 82, in 345 and 312 fathoms respectively.

Dictyocylindrus abyssorum, n. sp. (Pl. XII. fig. 3, and Pl. XV. fig. 25, *a*, *b*.)

General form dendritic, branched dichotomously three or four times on the same plane. Hard. Branches round, somewhat

compressed and expanded at the distal extremities, the terminal ones short, fork-like, but round at the ends; stem below the branches short, thick, expanded at the base. Colour yellowish white or dark brown. Surface even, hirsute (fig. 3, *a*). Pores and vents indistinct. Internal structure compact, increasing in density towards the axis, composed of spicules held together by cellular sarcode, which again is traversed by the excretory canals. Spicules of two kinds, viz. skeleton- and flesh-spicules. Skeleton-spicules of two forms, viz.:—1, large, acuate, attenuatingly pointed, bent or suddenly curved towards the large end, 92- by 1½-1800ths inch (Pl. XV. fig. 25, *a*); 2, subskeleton, sub-pinlike, smooth, attenuatingly pointed, nearly straight, sparsely microspined at the extremity of the inflated end, 45- by ½-1800ths inch (fig. 25, *b*). Flesh-spicules of three forms, viz.:—1, acuate, club-shaped, attenuatingly pointed, bent towards the large end, sparsely spined throughout, spines vertical, 19- by 1-1800ths inch (Pl. XII. fig. 3, *b*); 2, equianchorate, shuttle-like, with nearly straight shaft—6-6000ths inch long by 1½-6000ths inch broad at the arms (fig. 3, *c* & *f*); 3, tricurvate or bow-shaped, smooth, with pointed and spined extremities, 26-1800ths inch long (fig. 3, *d*, *e*). The large acuates form the chief part of the stem, where they are arranged vertically, while others are projected through the dermal sarcode at right angles to them, and thus give the hirsute character to the surface; the sub-pinlike spicule projects at the base of the latter, and the spined acuate flesh-spicules at their base again, appearing just beyond the dermal sarcode; while the equianchorate and bow-shaped flesh-spicules are dispersed generally throughout the structure. Size of largest entire specimen (of which there are two) 3½ inches long by 2½ inches broad; stem at the bottom ½ inch long and ¼ inch thick.

Hab. Marine, attached by an expanded base to hard objects.

Loc. Between the north of Scotland and the Faroe Islands, in 440 and 345 fathoms.

Obs. There are two specimens of this sponge, obtained respectively from stations 51 and 65, as indicated by the numbers on their respective jars. These numbers give the depths and locality above mentioned. The smaller specimen is alone, in the jar numbered "51;" while the other not only has a portion of *Halichondria Hyndmani* on one of its branches, but in the jar are also *Pachastrella abyssi*, *Wyville-Thomsonia Wallichii*, and all the specimens on the Terebratule and pebble mentioned under *Spongia officinalis*.

In several of the order Echinonemata, and especially of the branched forms of which *Dictyocylindrus abyssorum* is one,

the whole of the stem is very hard and the structure of the axis becomes extremely dense from the closely impacted state of the spicules of which it is composed; while the excretory systems, being numerous and short-branched, are consequently diminutive in form, so that neither the vents nor the pores are very conspicuous in sponges of this kind; again the acuate spicule is here, as generally in this order, more or less suddenly curved excentrically—that is, towards the large end, which thus, together with the inflation of this extremity, frequently resembles the hilt of a pistol.

Dictyocylindrus simplex, n. sp.

I have applied this name to small amorphous fragments of a sponge occurring here and there by itself and on other sponges dredged up between the north of Scotland and the Faroe Islands, which only differs from *D. anchorata* in the absence of anchorates. This is all the information that the specimens afford.

Dictyocylindrus virgultosus, Bk. (Mon. Brit. Spong. vol. ii. p. 113, and vol. iii. pl. xix. figs. 14–18). (Pl. XII. fig. 5, and Pl. XV. fig. 27.)

General form pyramidal or conical, elongated, sharp-pointed, expanded at the base; pyramids grouped. Colour yellowish white. Surface hirsute, even, covered with small eminences consisting of tufts of spicules radiating from points respectively, where their ends are gathered together and fixed in the dermal sarcode around the base of a large spicule. Pores and vents not evident, from the smallness of the specimens. Internal structure compact throughout, becoming most so towards the centre, composed of bundles of spicules in close approximation, arranged longitudinally and diminishing in number towards the apex of the cone; imbedded in cancellated sarcode, which is, no doubt, traversed by the excretory canals. Spicules of two kinds, viz. skeleton- and flesh-spicules. Skeleton-spicule of two forms, viz.:—1, large, acuate, smooth, sharp-pointed, curved suddenly or bent towards the large extremity, 132- by 1½-1800ths inch (Pl. XV. fig. 27); 2, subskeleton-spicule small, acerate, curved, sharp-pointed, 32- by ½-1800ths inch (Pl. XII. fig. 5, *d*). Flesh-spicules of one form only, viz. acuate or club-shaped, sharp-pointed, bent and inflated at the large extremity, uniformly spined throughout, spines short and vertical, 11- to 14-1800ths inch long (fig. 5, *c*). The large acuates are chiefly found in the body of the sponge, where they are arranged longitudinally or in vertical bundles; but the largest traverse the dermal sarcode obliquely and form

respectively the centre of each group of the small, subskeleton, acerate spicules (fig. 5, *d*), which thus give the surface its hirsute, tufted character. The flesh-spicules do not traverse the dermal sarcode, but are arranged, feather-like, and sparsely, around the acuates of the interior, varying much in size. Entire specimen consisting of a group of three cones, each of which is about 8-12ths inch long, and 3-12ths inch in diameter at the base.

Hab. Marine, on hard objects.

Loc. The North-Sea side of Shetland in 64 to 75 fathoms.

Obs. This sponge has been named, described, and illustrated by Dr. Bowerbank, as above indicated, from "Shetland, in the cabinet of the Rev. A. M. Norman;" but as the specimens were dry and mine is wet, it has seemed to me desirable to describe and figure it again from the latter. The figures on the jar are "67 and 68," which give the locality and depths above mentioned. On one of the cones has grown a specimen of *Grantia ciliata*, ? var. (fig. 6), and a small one of *Tethya cranium* (fig. 5, *a*). This is all that is in the jar. The *Grantia* will be described hereafter.

In the British Museum, among the specimens dredged up on board the 'Norna' on the coast of Portugal, is a sponge of a similar conical form, also grouped, but with a tuberculated surface, each tubercle of which is supported on a bundle of spicules that radiate from a solid, conical, central axis. Here, however, there is only one kind of spicule, viz. acuate, smooth, and sharp-pointed; so that it does not belong to the Ectyonida, but, belonging to the Axinellida, might be called "*Ciocalypta* (Bk.) *tuberculata*," seeing that, like other species of this group about to be mentioned, it will probably have to come under the order Echinonemata.

Another similar (*i. e.* conical) form has been described and named by Dr. Bowerbank *Ciocalypta penicillus* (Mon. Brit. Spong. vol. ii. p. 81, and vol. iii. pl. xiii. figs. 2–4); but this is a massive one, in which the characteristic conical heads, at first grouped, soon pass into a common body from which the characteristic ends alone project. There is a specimen of this kind in the British Museum, 6 inches in diameter, which, from its white surface and yellowish interior, might be taken for *Halichondria panicea*, Johnst. It also has only one form of spicule, viz. acuate, smooth, sharp-pointed.

A third species has been named "*C. Leei*" by Dr. Bowerbank (*op. cit.* vol. iii. pl. lxxxvi. figs. 1–3); it, again, has only one form of spicule, viz. acuate.

And a fourth the same author has named "*C. Tyleri*" (Proc. Zool. Soc. 1873, p. 21, pl. iv. figs. 9–12, from "Port

Elizabeth, Australia" [? Cape]). There is also a specimen of this in the British Museum from Port Elizabeth in S. Africa; but in this species the spicule is acerate, curved, and sharp-pointed (not acuate); still all present the same conical pyramidal forms, growing in groups like a pine-forest; and all but the first present the snow-white colour on the surface, with the light tawny-yellow colour interiorly, by which they so much resemble *Halichondria panicea*, that at first sight they might be taken for varieties of this sponge, as before stated.

Plumohalichondria microcionides, n. sp. (Pl. XII. fig. 11, and Pl. XV. fig. 30, *a*, *b*.)

General form, now, globular, sessile at one point. Colour yellowish white. Surface smooth, irregularly mamillated on the free side. Pores and vents? Internal structure, radiating in plumose branches closely approximated from the point of attachment upwards. Spicules of two kinds, viz. skeleton- and flesh-spicules. Skeleton-spicule of two forms, viz.:—1, large, acuate, attenuatingly pointed, globularly inflated and suddenly curved at the large end, which is thickly spined, smooth in the rest of its extent, 68- by 1½-1800ths inch (Pl. XV. fig. 30, *a*); 2, acerate, smooth, fusiform, attenuatingly pointed at each end, nearly straight, 38-1800ths inch long (Pl. XV. fig. 30, *b*). Flesh-spicules of two forms, viz.:—1, acuate, globularly inflated at the large end, attenuatingly pointed at the other, thickly spined throughout, 17-1800ths inch long (Pl. XII. fig. 11, *a*); 2, equianchorate, navicular in form; shaft long and slightly curved; arms long and slightly expanded, falcated, with half their extent thus webbed to the shaft, 28-6000ths inch long (Pl. XII. fig. 11, *b*). The acerate skeleton-spicules are confined to the fibre of the sponge, which is echinated with the large skeleton- and small spined acuates, while the equianchorates are dispersed generally. Size of specimen ½ an inch in diameter.

Hab. Marine.

Loc. Between the north of Scotland and the Faroe Islands, in 440 fathoms.

Obs. This little specimen is in a jar by itself, labelled 51, which gives the locality and depth above mentioned. It appears to me to be a rolled fragment of a larger sponge, while its thickness, combined with the presence of the acerate spicule, seems to ally it more to *Halichondria plumosa* than to *Microciona*, which is laminiform; still the character of the large acuate is peculiarly like that of *Microciona*; and hence the appearance of this spicule resembles that of a gradational form between these two sponges.

Microciona fecusculum, Bk. (*op. cit.* vol. iii. pl. lxxxiii. figs. 1–6).

This sponge was originally described by Dr. Bowerbank as a "*Hymeniacidon*" (*op. cit.* vol. ii. p. 198). The spicules are:—a partially spined, large, skeleton acuate; a smooth, acuate; pointed, subskeleton acerate; a small, entirely spined acuate, and an angulate or bow-shaped equianchorate.

Loc. Island of Harris, Hebrides.

Two specimens of this thin laminiform sponge were dredged up on board the 'Porcupine,' viz. at station 25, in 374 fathoms, near Cape St. Vincent, and at station 61, in 114 fathoms, near the Faroe Islands, respectively—the former, of a reddish colour, spreading over the flat surfaces of a piece of *Corallistes Bowerbankii*, and the latter, almost colourless, over a Terebratule. Both are characterized by possessing a smooth, acerate, subskeleton-spicule, and a much greater development of the spines round the bases of the two forms of acuates respectively, than in any other part; while the spicule-illustrations given by Dr. Bowerbank agree better with the colourless specimen on the Terebratule than with the red one on the piece of *Corallistes*. The spicules in the latter are not so large, the acuate skeleton-spicule less curved towards the base, and the equianchorate larger in the arms and more pointed at the ends, so as, laterally, to resemble a bow, of which the anterior arm of each end, being by recurvation closely approximated at their points, would form the cord or string. In both the tricurvate is absent; and the subskeleton-spicule, being acerate, smooth, and nearly straight, corresponds more with that of *Halichondria plumosa* than with that of the Microcionina generally, in which it is acuate. It may be questioned hereafter whether the differences noticed between the above-mentioned forms of *M. fecusculum* are sufficient to constitute two species. Colour alone in sponges is seldom of much specific value.

Microciona longispiculum, n. sp. (Pl. XII. fig. 1, *h*, and Pl. XV. fig. 31, *a*, *b*, *c*.)

General form thin, laminar, hirsute. Colour tawny. Surface hairy. Pores and vents not seen. Spicules of two kinds, viz. skeleton- and flesh-spicules. Large skeleton-spicule long, smooth, curved, thin, globularly inflated or bulbous at the fixed extremity, smooth throughout, 160-1800ths inch long by 2-1800ths inch in diameter at the bulb (Pl. XV. fig. 31, *a*). Subskeleton-spicule smooth, acuate, curved,

40-1800ths inch long (fig. 31, *b*). Flesh-spicule short, acuate, straight or slightly curved, inflated at the fixed extremity, spined throughout (fig. 31, *c*). As usual in *Microciona*, the whole of the spicules are arranged *vertically*, side by side, in the thin lamina of which the sponge is composed. Size of specimen about ½ an inch in horizontal diameter, and probably not more than 1-96th inch thick.

Hab. Marine, spreading over hard objects.

Loc. At station 65, in 345 fathoms.

Obs. This specimen is on the pebble bearing the Terebratule over which *Aplysina nævus* has grown (Pl. XII. fig. 1, *h*), at the base of the calcareous worm-tube covered with *Latrunculia cratera*, Boc., which is also thin, spreading, and laminiform, as will be hereafter noted.

Microciona plana, n. sp.

General form thin, laminar. Colour tawny. Surface hirsute. Pores and vents not seen. Spicules of two kinds, viz. skeleton- and flesh-spicules. Large skeleton-spicule simple, acuate, curved most towards the fixed end, smooth throughout, 65-1800ths by 1½-1800th inch. Subskeleton-spicule the same, but not more than half this size. Flesh-spicules of two forms, viz.:—1, acuate, bulbous at the large end, spined throughout, 15-1800ths inch long; 2, equianchorate, navicular, shuttle-like, 7-6000ths inch long. The skeleton-spicules are arranged vertically side by side, the spined acuates feather-like around the bases of the long spicules respectively, and the anchorates scattered irregularly throughout the lamina of which the sponge is composed. Size of specimen about 1 inch in horizontal diameter.

Hab. Marine, spreading over hard objects, laminiform.

Loc. At station 25, in 374 fathoms, near Cape St. Vincent.

Obs. This specimen is on the upper surface of a rough, flat, slate-like stone, which also bore the living specimen of *Macandrewia azorica* that will hereafter be mentioned. The thin lamelliform state of the Microcionina effectively precludes an evident appearance of both pores and vents, which, although, of course, present as part of the structure of a sponge, can only be followed here with the microscope.

Microciona intexta, n. sp. (Pl. XV. fig. 43, *a*, *b*, *c*.)

As *Pachastrella intexta* (which will be described hereafter) grows in among the spicules of dead *Corallistes Bowerbankii*, extending from the surface downwards, so this *Microciona* grows, causing a brown discoloration of the *Corallistes*, which

discoloration, when placed under the microscope, is found to arise from the presence of sarcode charged with two kinds of spicules, viz. one skeleton- and one flesh-spicule. Skeleton-spicule acuate, straight, but with the large end suddenly bent to one side (like the head of a walking-stick), and terminating attenuatingly in a point at the other end, sparsely covered with short vertical spines throughout, 80- by 3-6000ths inch (Pl. XV. fig. 43, *a*). Flesh-spicule a simple bihamate, much curved, and more or less tortuous (fig. 43, *b*). The skeleton-spicules are sparsely imbedded among the flesh-spicules, which are exceedingly numerous and thrown together confusedly, so as to form the greater part of the mass (fig. 43, *c*). Pores and vents not seen. Size of portion of discoloration in the *Corallistes* about ¼ inch in diameter.

Hab. Marine, on *Corallistes Bowerbankii*.

Loc. Station 25, in 374 fathoms, near Cape St. Vincent.

Obs. This sponge is chiefly remarkable for the form of its skeleton-spicule and the mass of bihamates in which it is imbedded. Being parasitic among the spicules of *Corallistes*, I, of course, can give no description of its form: I am not quite certain that it should be called a *Microciona*, and therefore only give this generic name provisionally.

Microciona pusilla, n. sp. (Pl. XVI. fig. 51, *a*, *b*, *c*, *d*.)

I have met with another *Microciona* of the same kind, growing on *Polytrema utriculare*, not dredged up on board the 'Porcupine' (Ann. 1876, vol. xvii. p. 210), but probably from the tropics. (Dr. Bowerbank has figured a similar spicule from *Oculina rosea*, *op. cit.* vol. i. pl. xi. fig. 243.) In my instance, however, the skeleton-spicules are smooth, and the bent portion of the large end has a tendency to a spiral twist (*a*, *b*); while they grow erect on the surface of the *Polytrema*, with fine acuates between them (*c*), and minute bihamates (?) scattered throughout the structure, which are almost too small to be satisfactorily described under a ¼-inch object-glass (*d*). The thick skeleton-spicule with bent large end is hardly more than a quarter the size of that of *Microciona intexta*, although somewhat similar in form, being about 36- by 1-6000ths inch in its greatest diameters.

Phakellia ventilabrum, Bk., = *Halichondria v.*, Johnston.

Fragments of this sponge appear in jars 61–63, 64, 65, and 84, which, being the numbers of the stations where they were dredged up, indicate a depth varying between 155 and 640 fathoms, and a locality extending north of the Butt of Lewis to

Thorshaven in the Faroe Islands, and the Haaf banks on the east of Shetland; also in jar No. 25=374 of 1870, near Cape St. Vincent. The finest and most perfect specimens that I have ever seen are those from the Haaf banks, presented to the British Museum by Dr. Bowerbank.

Phakellia (Bk.) *infundibuliformis*, C.,=*Halichondria inf.*, Johnston.

Entire specimens and fragments of this sponge appear in jars 65, 78, and 83, which, being the numbers of the stations where they were respectively dredged up, indicate a depth varying from 290 to 345 fathoms, with a locality between the Orkney, the Shetland, and the Faroe Islands.

This sponge in general form is very like, although much inferior in size to, *Phakellia ventilabrum*—indeed just as Johnston has described it; and I can see no reason for altering any thing but Johnston's generic name to "*Phakellia*," and not to "*Isodictya*" as Dr. Bowerbank has done. The spicules are essentially those of *Phakellia ventilabrum*, viz. an acuate and an acerate; but they are shorter, stouter, and straighter than those of the latter, the acerate being simply curved, and not undulating as in *P. ventilabrum*. Outlines of two specimens of *P. infundibuliformis* in its fan-shaped form may be seen *in situ* on the pebble on which they have grown (Pl. XII. fig. 1, *fff*).

[To be continued.]

XXI.—*On a Collection of Lepidoptera from Port Moresby, New Guinea.* By Arthur G. Butler, F.L.S. &c.

The following species were recently received from Mr. W. Y. Turner of the London Medical Mission at New Guinea, and form a very interesting little collection. Most of the named species were previously known from Aru, only one or two of the commoner and more widely ranging species being identical with those of Australia.

Rhopalocera.

Family **Nymphalidæ**.

Subfamily *Danainæ*, Bates.

Genus Danais, Latreille.

1. *Danais ferruginea*, n. sp.

Allied to *D. mytilene*, but the transverse, oblique, subapical